

Low-Cost Cruise Missile Defense Program

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ADVANCED RF SENSORS

DARPA's Special Project Office's (SPO) RF Sensors programs are addressing the post-Cold War world's smaller, more dynamic threats by developing:

- low-cost seekers for interceptors to respond to cruise missile and aircraft attacks;
- easily transportable phased-array radars;
- reconfigurable antenna aperture technologies;
- new signal processing architectures.



The **Low-Cost Cruise Missile Defense (LCCMD)** program is developing a Ka-band electronically-scanned seeker that will aid development of low-cost interceptors to counter attacks by inexpensive cruise missiles and light aircraft. DARPA has awarded a contract to develop a low-cost seeker based on a MEMS-ESA, and issued a Broad Agency Announcement, in the third quarter of FY03 to encourage additional innovation in developing a low cost Ka-band radar seeker.

Electronic countermeasures (ECM) also pose a considerable threat to our sensor systems and communications. The **Reconfigurable Aperture Program (RECAP)** is developing antenna aperture technologies that dramatically increase antenna bandwidth capabilities, enabling wideband and multiband radars and communication systems that operate through a single aperture. Based on the 10:1 instantaneous bandwidth achieved in RECAP, SPO has opened a BAA for designing and building ultra-wideband phased array systems.

Both RECAP and LCCMD may benefit from micro-electromechanical systems (MEMS). Current MEMS power handling and lifetimes are too low for many desired applications. SPO's **RF MEMS Improvement Program (RMIP)** is addressing these shortcomings by requiring contractors to improve the RF characteristics, lifetimes, manufacturability, and affordability of their RF MEMS devices.

The **Lightfoot** program is developing technologies to produce very large, stowable, lightweight, low-power phased-array radars. These large aperture antennas will satisfy radar requirements for power-aperture with very low radiated power. The Lightfoot program plans to issue a BAA early in FY03, with parallel paths of development for the transmit/receive (T/R) chip and the other array radar antenna components.

The **Knowledge Aided Sensor Signal Processing Expert Reasoning (KASSPER)** improves our view of the battlefield by allowing sensor signal processors to replace statistics with site-specific information available from databases, dynamic maps, and with consideration of the physics underlying radar returns. DARPA and AFRL are jointly sponsoring a series of annual KASSPER workshops to discuss prior knowledge of complex clutter, development of intelligent signal processing algorithms, and real-time processing architectures.

These programs are contributing to a flexible, agile RF sensor capability that will greatly increase our ability to respond to the emerging threats of the 21st century. SPO's new program opportunities will greatly increase the usefulness and potential applications of our advanced sensor systems.